SUMMARY OF THE OFFICE ACTION

1) Claims 14, 15, 17 and 18 have been allowed.

2) Claims 3, 4, 7, 8 and 12 have been indicated as allowable.

3) Claims 1, 2, 5, 6, 9-11, 13, 16 and 20 have been rejected;

   i) Claims 1-2, 5-6, 16 and 20 have been rejected under 35 U.S.C. 103(a) as unpatentable over US Patent No. 4,227,092 (Campagnuolo et al.) in view of U.S. Patent No. 6,566,777 (Abu Akeel).

   ii) Claims 9-11 have been rejected under 35 U.S.C. 103(a) as unpatentable over U.S. Patent No. 5,043,618 (Stephenson) or U.S. Patent No. 4,883,999 (Hendershot) in view of US Patent No. 4,227,092 (Campagnuolo et al.) in view of Japanese Patent No. JP-2-275146 (Kumagai); and

   iii) Claim 13 has been rejected under 35 U.S.C. 103(a) as unpatentable over U.S. Patent No. 6,288,471 (Kometani et al.) in view of US Patent No. 4,227,092 (Campagnuolo et al.) or Japanese Patent No. JP-2-275146 (Kumagai).

4) Claim 12 has been objected to because of disordered claim dependency.

5) Claim 18 has been objected to as containing abbreviations.

RESPONSE TO THE OFFICE ACTION AND REJECTIONS

1) Claims 14, 15, 17 and 18 have been allowed.

Applicant acknowledges the allowance of these claims with appreciation.

2) Claims 3, 4, 7, 8 and 12 have been indicated as allowable.

Applicant acknowledges the allowability of these claims with appreciation and has placed claims into independent form so that they may be allowed.

3) Claims 1, 2, 5, 6, 9-11, 13, 16 and 20 have been rejected;

   a. Claims 1-2, 5-6, 16 and 20 have been rejected under 35 U.S.C. 103(a) as unpatentable over US Patent No. 4,227,092 (Campagnuolo et al.) in view of U.S. Patent No. 6,566,777 (Abu Akeel).

Applicant has provided a Declaration under 37 C.F.R. 1.131 evidencing conceptual, constructive and/or actual reduction to practice of the subject matter of these claims.

Applicant submits herewith the Declaration of Ernie Davison clearly evidencing full and complete possession of the subject matter of the presently claims subject matter (with substantive antecedent basis for all limitations thereto). The physical evidence supporting this declaration includes at least the following provisional U.S. Patent Applications:

1) EDM ProvisionalPatent Application 60-316-294 FilingDate Sept4,2001 EHO 01153 _P0-35;
2) EDM ProvisionalPatent Application 60-322-471 FilingDate Sept17,2001 EHO 01157 P0-32;
3) 3)EDM ProvisionalPatent Application 60-347-253 FilingDate Jan14,2002 EHO 01159 P0-14;
4) 4)EDM ProvisionalPatent Application 60-355-832 FilingDate Feb13,2002 EHO 01158 P1-48;
5) 5)EDM ProvisionalPatent-Application 60-305-837 FilingDate July17,2001 EHO 00147_P1-32;
6) 6)EDM ProvisionalPatent-Application 60-316-293 FilingDate Sept4,2001 EHO 01154 _P1-33; and

7) EDM ProvisionalPatent-Application 60-316-295
FilingDate Sept4,2001 EHO 01155 _P0-41.pdf

These documents as filed, and as already present in the US Patent and Trademark Office provide clear and complete evidence of the conception of the subject matter claimed in the present application as early as July 17, 2001; September 4, 2001 and September 14, 2001, each of these dates being earlier than the reference date available for U.S. Patent No. 6,566,777 (Abu Akeel), which has an available reference date of 5 October 2001. As that reference is an essential element of this rejection and is no longer available for the present rejection, this rejection must be withdrawn.

Applicant has provided sufficient pages from these documents to evidence that the subject matter of the claims is evidenced in the documents as filed.

Claims – 1-2, 5-6, 16 and 20	**Primary Teachings**	**Secondary Teachings**
Davison's Currently Amended Claims-1-2, 5-6, 16 and 20 relate to harmonic drive flexispline motors using electromagnetic radial directed force in conjunction with radially meshing gear teeth to distort a rotatively fixed flexispline which meshes with gear teeth on a rotatable hub resulting in torque multiplication at a reduced output speed..	**Campagnuolo (US Patent No. 4,227,092) teaches:** 1) Campagnuolo's electric machine component is a 3 phase sinusoidal alternator, no commutator, has rotating rotor (Secondary) with fixed permanent magnets to provide rotating uncontrolled magnetic field which operates on a different physical principle (Faraday's second law of magnetic induction as opposed to variable reluctance embodied in Davison). 2) Campagnuolo's harmonic gear is a standard version which uses an elliptic cam wave generator and functions only as speed increaser. Davison employs harmonic gear principle minus the mechanical wave generator and uses a rotating electromagnetic field to distort the rotationally fixed flexispline radially in conjunction with radially meshing gear teeth, thus varying the air gap space and hence the	**AbuAkeel (U.S. Patent No. 6,566,777) teaches:** 1) Although superficially similar to Davison, AbuAkeel has a fundamental operational difference in that AbuAkeel uses frictional surfaces on the stator and rotating secondary (flexispline) to transform and translate the electrical energy input into mechanical torque output. As a consequence his device is limited in power output and does not exploit the large radial electromagnetic force for output torque production (see Krishnan reference) but rather only to increase friction traction whereas Davison employs the inclined plane/wedge principle of gear like teeth to transform the radial force into torque. AbuAkeel has limited teaching on magnetics, control and commutation which are

	stator magnetic reluctance to effect both motoring and generating functions. 3) In particular Campagnuolo's alternator cannot (even with extensive modification) be made to function on the same principles as Davison's patent (ie the mechanical variation of the radial air gap by electromagnetic force in order to vary magnetic reluctance).	essential in order for his device to function. 2) Other significant differences between AbuAkeel and Davison are: AbuAkeel employs permanent magnets in conjunction with electromagnets, a rotating Secondary (flexispline) and rotating elliptic cam whereas Davison does not employ or claim any of these and AbuAkeel is silent on electrical power generation capabilities.

Summary for claims: 1-2, 5-6, 16 and 20

1. Rejections based upon Campagnuolo's teachings are untenable due to an attempt to combine non-analogous reference materials without establishing any nexus beyond motors.
2. Rejections based upon AbuAkeel's teachings are untenable at least as a matter of Law due to Applicant's establishment of an earlier priority date.

Claims 9-11 have been rejected under 35 U.S.C. 103(a) as unpatentable over U.S. Patent No. 5,043,68 (Stephonson) or U.S. Patent No. 4,883,999 (Hendershot) in view of US Patent No. 4,227,092 (Campagnuolo et al.) in view of Japanese Patent No. JP-2-275146 (Kumagai)

Claims: 9-11	**Primary Teachings**	**Secondary Teachings**
9. (CURRENTLY AMENDED) An electromagnetic core for a flexispline motor comprising a magnetically permeable core of a hub and spoke shaped construction, said core comprising: a) Stacked laminations to form a unitary structure having a number of radially spaced rectangular profile poles surrounding said hub and	**Stephenson (U.S. Patent No. 5,043,618) teaches:** 1) Stephenson deals with reluctance motors embodying a stator and rotatable rotor, both with salient magnetic poles. The main focus is on the arrangement of mainly stator pole configurations with the objective of minimizing iron losses and material expenditure, generally by establishing regions of zero or near zero magnetic flux. Stephenson does not seek to exploit the available strong radial force	**Campagnuolo Teaches: (US Patent No. 4,227,092)** 1) Campagnuolo's electric machine component is a 3 phase sinusoidal alternator, no commutator, has rotating rotor (Secondary) with fixed permanent magnets to provide rotating uncontrolled magnetic field which operates on a different physical principle (Faraday's second law of magnetic induction as opposed to variable reluctance embodied

wherein the said core pole faces are skewed longitudinally or tapered longitudinally or both tapered and skewed longitudinally so as to effect a parallel longitudinal air gap between the said core pole faces and the inwardly distorted portions of the flexispline. b) A winding fitted to each pole or group of poles so as to produce a rotating electromagnetic [[~~magnetic~~]] field in each pole, and wherein the windings on each group of complementary poles on said electromagnetic core are energized and configured electronically to produce radially directed rotating forces which consequently produce rotating multilobal flexispline distortions of at least two lobe shapes. [[~~hub being energized to produce magnetic fields which fields produce a multilobal flexispline distortion of two lobe or three lobe shape.~~]] 10. (CURRENTLY AMENDED) An electromagnetic core as claimed in claim 9 wherein the coils of each group of complementary poles on said [[~~hub~~]] electromagnetic core are connected in a series or parallel relationship. 11. (CURRENTLY	(see Krishnan reference) and Stephenson is silent on same. 2) There is no reference to harmonic strain wave principles particularly with respect to stator pole configuration to minimize iron losses or deflection of flexisplines and Davison does not make similar claims or proposals particularly with respect to stator pole configuration to minimize iron losses. *** **Hendershot (U.S. Patent No. 4,883,999) teaches:** Hendershot teaches: 1) Hendershot's patent deals with electronic control and commutation of reluctance motors embodying a stator and rotatable rotor (Davison's secondary – the flexispline – does not rotate and has no salient poles) both with salient poles. 2) The main focus of this patent and claims is to reduce iron losses (by reducing flux and/or avoiding magnetic reversals – and their frequency) and reducing eddy currents by similarly reducing flux switching frequency. 3) Arrangement of the pole spacing is also proposed to achieve these objectives. In Davison there is no similar proposal or claim. 4) In Davison claim#13 of variable width teeth is specifically directed to equalize saturation flux levels in the teeth, wherein computer simulations show increases in radial directed force of up to 60% over	in Davison). 2) Campagnuolo's harmonic gear is a standard version which uses an elliptic cam wave generator and functions only as speed increaser. Davison employs harmonic gear principle minus the mechanical wave generator and uses a rotating electromagnetic field to distort the rotationally fixed flexispline radially in conjunction with radially meshing gear teeth, thus varying the air gap space and hence the stator magnetic reluctance to effect both motoring and generating functions. 3) In particular Campagnuolo does not discuss electromagnetic core arrangements or the magnetics or the electrical connections or windings for same and has no teaching about electric motor torque production. *** **Kumagai (JP 02-275146) teaches:** 1) Kumagai's patent indicates claims to a harmonic gear motor in which the conventional rotating elliptical cam is replaced with a sealed-in magnetic ferro-fluid which when subjected to a concentrated magnetic flux field coalesces into a semi-rigid body. When the electro magnetic field rotates, this semi-rigid fluid body rotates, replacing the action of the

AMENDED) An electromagnetic core in a structure [[~~of a~~] for the production of a continuous wave deflection in a magnetically permeable flexispline member in a flexispline motor comprising, a series of stacked magnetically permeable laminations or equivalent composites, stacked to form a unitary core having a hub and spoke configuration, such that a number of rectangular cross section [[~~profile~~]] core legs extend radially from said core hub at evenly spaced intervals, and wherein the said core leg outer pole faces are skewed longitudinally or tapered longitudinally, or both skewed and tapered longitudinally, so as to effect a parallel longitudinal air gap between the core leg outer pole faces and inwardly maximum distorted portions of the flexispline, each leg containing electromagnetic coil windings [[~~coils~~]], each electromagnetic coil being sequentially energized from a source of electrical energy to produce a rotating [[~~electrical field~~]] radially directed electromagnetic force in said electromagnetic core, and wherein **said** [[~~magnetic~~]] forces produced in each opposing complementary group of core legs is in a	non variable width teeth. In addition the Davison claim#14 for variable spacing of teeth etc. is specifically directed to focusing and concentrating the radially directed force. 5) Hendershot also teaches electronic commutation for reluctance motors, but this is significantly different for Davison strain wave motor, one relates to switching salient poles on a rotating rotor, whereas Davison deals with radial moving teeth on a rotatively fixed secondary (flexispline) member, and continuous unidirectional stator field flux rotation.	rotating mechanical cam. 2) The claimed purpose of this device is to minimize wear and friction losses associated with a conventional harmonic gear using an elliptical cam. 3) In this patent there is no teaching as to: a) how the device is controlled, commutated or powered b) the design of the magnetics, including the ferro fluids 4) It would appear from the brief schematic that the output power is limited to low values 5) There is only a very limited claim and no reference to core teeth/slots/poles etc. Therefore the rejection of claims#9,10,11 based upon Kumagai are invalid

bucking relationship.		

US 4,883,999 Hendershot

No.	Patent Number	Inventor		Issued Date	
PA-4	US 4,883,999	Hendershot		28-Nov-89	

Prior Art Claims (Hendershot)	Comments
1. An electric machine powered by a polyphase source comprising: a first member of magnetic permeable material, having plurality of poles unevenly spaced relative to one another; a second member of magnetically permeable material, having a plurality of poles evenly spaced relative to one another; means for mounting said first and second members for relative movement such that said poles of said first and second members face one another; said poles of said first member being arranged in pairs such that the intra-pair spacing between poles of a pair is approximately equal to the even spacing of said poles of said second member and the inter-pair spacing between poles of different pairs is unequal to the even spacing of said poles of said second member such that at least one but not all of said pairs may be simultaneously aligned with said poles of said second member to form a low reluctance path between said first and second members; and means for forming a magnetic flux path bridging said first and second members which polarizes said at least one pair of poles of said first member to form salient magnetic poles of opposite polarity such that the portion of said flux path through said	1. In EDM the first member (Stator) has a plurality of poles "evenly spaced relative to one another" (which is similar to most existing electric machines). 2. IN EDM the second member does not have a plurality of evenly spaced poles nor does the secondary member have any defined poles at all. 3. In EDM the secondary member (flexi-spline) does not have <u>any</u> defined poles so the question of the facing mounting arrangement does not arise. 4. EDM does not have any defined secondary poles and the primary poles are evenly spaced for EDM. This arrangement does not apply to EDM. The purpose of this claim is to reduce iron hysterisis and eddy current losses whereas in EDM the varying width of the stator teeth is to equalize flux saturation patterns in excited teeth. IN EDM all of the poles of the first member (stator) and secondary member (flexisplime) poles are automatically aligned (by default) upon excitation. **Notes – This patent deals with switched reluctance motors with salient poles on both stator and rotating rotor 5.** 5. EDM figures 15 & 21 show that flux paths in first or primary member (stator) do not significantly overlap any other

first member does not overlap any other flux paths found in said first member.	flux paths except for stray flux due to EDM's winding configuration which is different than Hendershots.
2. An electric machine as set forth in claim 1 wherein said means for forming a magnetic flux path includes a polyphase energization source which polarizes said at least one pair of poles of said first member to form salient magnetic poles opposite polarity such that the flux switching frequency in at least a portion of said first member is less than the commutation frequency of each phase of said polyphase source multiplied by the number of phases in said polyphase source.	1. Hendershot claim (1) does not represent the electrical machine of EDM 2. Excitation pulses in EDM are uni-polar DC with two pulses per field revolution at the commutation frequency which results in no flux reversal. EDM figures 16 & 17 show current pulses for each stator coil over 180 degrees of rotation.
3. An electric machine as set forth in claim 2 wherein said magnetic flux paths do not overlap one another in said first member.	1. Hendershot claim (1) does not represent the electrical machine of EDM 2. In EDM flux paths in first or primary member (stator) do not significantly overlap one another (see EDM figures 15 & 21) due to EDM's winding configuration which is different than Hendershots except for stray or fringing magnetic flux. 3. Claim (3) depends on claim (2) which is dependent upon claim (1).
4. An electric machine as set forth in claim 1 wherein said means for forming a magnetic flux path includes an energization source which controls the direction of said flux flow in said paths so as to prevent reversal of said flux flow in said first member.	1. Hendershot claim (1) does not represent the electrical machine of EDM. 2. In EDM excitation pulses are DC uni-polar with alternate primary poles that are wound in the opposite directions (see EDM figures 14, 20 & 23). The effect of this is that flux reversals in EDM do not occur in the first/primary member.
5. An electric machine as set forth in claim 1 wherein said second member is a rotor rotatable about an axis and said first member is a stationary stator, said means for forming a magnetic flux path including windings wound about said poles of said stator.	1. Hendershot claim (1) does not represent the electrical machine of EDM. 2. The EDM second member (flexispline) is a rotatively fixed cup that does not rotate and is therefore not consider a rotor. 3. Note - Most existing electrical machines have stationary stators.

6. An electric machine as set forth in claim 5 wherein said means for forming a magnetic flux path includes an energization source for said windings which controls the relative polarities of said poles of said stator so all flux flowing through adjacent stator poles also flows through a back iron area of said stator joining said adjacent stator poles.	1. Claim (6) depends on claim (5) which depends on claim (1) which does not represent EDM's electrical machine. 2. IN EDM the energization source does not control the relative polarities of stator poles. EDM control of relative polarities results from alternate winding direction of adjacent stator poles and employing uni-polar DC excitation 3.
7. An electric machine as set forth in claim 5 wherein said means for forming a magnetic flux path includes an energization source for said windings which controls the relative polarities of said poles of said stator so all flux flowing through a pair of stator poles also flows through a back iron area of said stator joining said pair of poles.	1. Claim (7) depends on claim (5) which depends on claim (1) which does not represent EDM's electrical machine. 2. Claim (7) references Claim (5) which asserts the second member is a rotatable rotor whereas EDM's secondary member (flexi-spline) is rotatively fixed with radial changes in air gap and its flux linkages . 3. Relative polarities of the EDM stator poles are determined by the winding direction of alternate poles (see EDM fig 14, 20 & 23) and not by the energization source.
8. An electric machine as set forth in claim 1 wherein said plurality of poles of said first member are arranged such that neighboring poles of different pairs have the same polarity when polarized by said means for forming a magnetic circuit.	1. Claim (8) depends on claim (1) which does not represent EDM's electrical machine. 2. In EDM neighboring poles of different pairs have different polarities
9. In the electric machine as set forth in claim 5, a method comprising the step of: energizing each of said pairs of stator poles such that a pole face of each pole in a pair is magnetically saturated while a back iron area of said stator which provides a flux path between said pair remains magnetically unsaturated relative to said pole faces.	1. Claim (9) depends on claim (5) which depends on claim (1) which does not represent EDM's electrical machine. 2. I claim (9) it references Claim (5) which asserts the second member is a rotatable rotor whereas EDM's secondary member (flexi-spline) is rotatively fixed whose surface moves radially to effect changes in reluctance.

10. An electric machine as set forth in claim 1 wherein said first and second members are without permanent magnets.	1. Claim (10) depends on claim (1) which does not represent EDM's electrical machine. 2. EDM does not claim using or not using permanent magnets.
11. A motor powered by a polyphase source comprising in combination: a stator having a back iron and poles extending radially from and circumferentially spaced about said back iron; a rotor of magnetically permeable material and without windings or permanent magnets mounted for rotation about a longitudinal axis and having a generally cylindrical surface with poles extending radially therefrom; an air gap generating the pole faces of said stator and rotor poles; a plurality of windings associated with said stator poles and wired to said polyphase source so that each phase energizes at least one pair of circumferentially adjacent stator poles to form salient magnetic poles of opposite polarity which impart a torque to said rotor; and an area of said back iron bridging said at least one pair of circumferentially adjacent stator poles included in a magnetic circuit for the flux generated by said pair of stator poles when they are energized as salient poles such that said back iron area is not a part of any other magnetic circuit.	1. In EDM there isn't a rotatable rotor which rotates about a longitudinal axis. 2. In EDM the second member (flexispline) is rotatively fixed whose cylindrical surface moves radially to effect a change in reluctance. EDM's cylindrical surface does not have poles extending radially from it. 3. In EDM there are no rotor poles and therefore no rotor pole faces. 4. In EDM there are no salient poles on the rotor and therefore no imparted torque to said rotor. 5. The last paragraph is not relevant to EDM.
12. A motor powered by a polyphase source as set forth in claim 11 wherein said pole faces of said stator poles in each of said pairs of circumferentially adjacent stator poles are circumferentially separated by a first angle approximately equal to an angle separating neighboring poles of said rotor.	1. Claim (12) refers to claim (11) and claim (11) is not relevant to EDM. 2. In EDM all stator poles including those in pairs are separated by the same angle or evenly spaced. 3. EDM's second member (flexispline) does not have any defined poles and

	therefore does not have an angle separating rotor poles.
13. A motor powered by a polyphase source as set forth in claim 11 wherein said pole faces of said rotor poles are circumferentially unevenly spaced so as to form pairs of poles wherein the inter-pair spacing is approximately equal to the spacing between stator poles and the inter-pair spacing is unequal to the spacing between adjacent stator poles.	1. Claim (13) refers to claim (11) and claim (11) is not relevant to EDM. 2. In EDM the second member or flexispline does not have any defined poles and therefore the claim of uneven pole spacing is not applicable to EDM.
14. A motor powered by a polyphase source as set forth in claim 12 wherein each of said pole faces of said stator poles in one of said pairs of circumferentially adjacent stators poles is circumferentially separated from a pole face of a stator pole in a neighboring pair by a second angle that is not equal to said first angle or an integer multiple thereof.	1. Claim (14) refers to Claim (12) depends on claim (11) which is not relevant to EDM. 2. In EDM all stator pole faces (including those in pairs) are evenly spaced and separated circumferentially by the same angle.
15. In the motor as set forth in claim 11, a method comprising the step of: energizing the windings of said at least one pair of circumferentially adjacent stator poles such that said pole faces of said pair are magnetically saturated while said back iron area of said magnetic circuit generated by said at least one pair remains magnetically unsaturated relative to said pole faces.	1. Claim (15) depends on claim (11) which is not relevant to EDM. 2. In EDM generally speaking it is the second member (flexispline) which becomes magenetically saturated

16. In the motor as set forth in claim 11, a method comprising the step of: energizing the windings of at least two pairs of circumferentially adjacent stator poles such that circumferentially neighboring magnetic poles of different pairs are of the same polarity.	1. Claim (16) depends on claim (11) which is not relevant to EDM. 2. In EDM the circumferential neighboring stator magnetic poles of different pairs are never of the same polarity.
17. A motor comprising, in combination, a stator having a plurality of adjacent pole pairs with each pole a member of only one pair and windings on said pairs for forming a direct flux path between poles in each pair, a rotor having a plurality of equally spaced poles for forming a low reluctance path between stator poles in a pair, the windings on stator poles in a pair being oppositely wound to create a north/south magnetic field between said stator poles in a pair, said stator poles in a pair being spaced by a first distance related to the spacing between rotor poles, and adjacent stator pole pairs being separated from each other by a second distance so that energization of said stator pole pairs in a predetermined sequence causes movement of said rotor.	1. In EDM the second member (flexispline) is not a rotor and is rotatively fixed and does not have a plurality or any defined poles and therefore spacing is irrelevant to EDM. 2. In EDM spacing of stator pole pairs or poles is even and not related to any supposed rotor poles. 3. In EDM the second member (flexispline) is not a rotor and does not rotate.
18. A motor as set forth in claim 17 wherein each pair of adjacent poles is joined by magnetically permeable material in order to provide a flux guide between the poles.	1. Claim (18) depends on claim (17) which is not relevant to EDM.
19. A motor as set forth in claim 18 wherein said magnetically permeable material is not saturated when said pair of adjacent stator poles is energized.	1. Claim (19) depends on claim (18) which is dependent on clam (17) which is not applicable to EDM.

20. A motor as set forth in claim 17 wherein said motor is a linear motor having a linear rotor and stator.	1. Claim (20) depends on claim (17) which is not relevant to EDM. 2. EDM does not claim a linear motor or linear rotor.
21. A motor as set forth in claim 17 wherein said motor is a rotating motor where said rotor rotates about an axis.	1. Claim (21) depends on claim (17) which is not relevant to EDM. 2. In EDM the second member (flexispline) is rotatively fixed and is not a rotor and does not rotate at all nor about an axis.
22. In a motor as set forth in claim 17, a method comprising the steps of: simultaneously energizing more than one pair of poles such that at least a portion of a back iron area of said stator experiences a flux switching frequency less than the phase frequency multiplied by the number of phases in said polyphase source.	1. Claim (22) depends on claim (17) which is not relevant to EDM. 2. IN DM all portions of stator back-iron experience the same flux switching frequency.
23. In a motor as set forth in claim 17, a method comprising the step of: simultaneously energizing more than one pair of poles such that neighboring poles of different energizing pairs are of the same polarity, thereby assuring the magnetic circuits formed are only those provided by the direct flux paths between poles in a pair.	1. Claim (23) depends on claim (17) which is not relevant to EDM. 2. In EDM neighboring poles of different energizing pairs never have the same magnetic polarity.
24. A method as set forth in claim 23 wherein each direct flux path formed by a pole pair does not overlap the flux path of any other pole pair. **Same comments as with respect to claim 6.**	1. Claim (24) depends on claim (23) which dependent on claim (17) which is not applicable to EDM. 2. Claim (23) is not applicable to EDM 3. In EDM direct pole pair flux paths DO overlap the flux paths of other pole pairs { EDM figures 15 & 21 show that flux paths in first or primary

	member (stator) do not significantly overlap any other flux paths except for stray flux due to EDM's winding configuration which is different than Hendershots }
25. A motor comprising, in combination, a first member having a plurality of circumferentially spaced poles with equal spacing between the poles, a second member having a plurality of circumferentially spaced poles with angles between the poles alternating between first and second angles, means for polarizing said poles of said first and second members to form on each member at least one pair of adjacent salient poles of opposite polarity separated by said first angle such that said pairs of poles on said first and second members are drawn into radially aligned to form a low reluctance path between said pairs of salient poles, said second angle being different than said first angle so that polarization of said pairs of poles of said first and second members in a predetermined sequence causes different pairs of adjacent poles of said first and second members to be drawn into radial alignment, thereby causing relative rotation of said first and second members.	1. In EDM the second member (flexispline) does not have a plurality of circumferentially spaced poles and therefore angles between them does not apply. 2. In EDM the second member does not have any salient poles and therefore polarity is not relevant to EDM. 3. In EDM the process of drawing the poles of the first member (stator) and second member (flexispline) into alignment does not apply since the poles on the stator do not move and the fleixpline does not have any fixed poles and the movement of the second member is only radial. 4. In EDM there is no relevant rotation of the first and second members.
26. A motor as set forth in claim 25 where each pole of said first member is a member of only one pair of salient poles.	1. Claim (26) depends on claim (25) and claim (25) is not applicable to EDM. 2. In EDM there are no pairs of adjacent poles of opposite polarity on either the first of second members.
27. A motor as set forth in claim 26 where a magnetic circuit incorporating said low reluctance path is formed upon polarization of said poles of said first and second members to form said pairs of salient poles and each of said magnetic circuits do not overlap any other magnetic circuit.	1. Claim (27) depends on claim (26) which depends on claim (25) and claim (25) is not applicable to EDM. 2. IN EDM there are no pairs of salient poles linking the first member (stator) and second member (flexispline). 3. In EDM the said magnetic circuits do overlap.

28. In a motor as set forth in claim 27, a method including the step of: energizing said pairs of salient poles of said first and second members so that neighboring poles of two energized pole pairs on a member are of the same polarity.	1. Claim (28) depends on claim (27) which depends on claim (26) which depends on claim (25) and claim (25) is not applicable to EDM. 2. In EDM there are no pairs of salient poles on the first member (stator) and second member (flexispline). 3. In EDM neighboring poles of two energized pole pairs on a member are not of the same magnetic polarity
29. In a motor as set forth in claim 25, a method including step of: arranging the polarities of the poles of said second member such that at least a portion of said second member experiences a flux switching frequency which is less than the frequency of said polyphase source multiplied by the number of phases in said polyphase source.	1. Claim (29) depends on claim (25) and claim (25) is not applicable to EDM. 2. In EDM all portion of the second member (flexispline) experience the same flux switching frequency due to being a cup formed of a continuous magnetic permeable material.
30. In a motor powered by a polyphase source having first and second members mounted for relative rotation and a plurality of poles on one of said members circumferentially arranged in a regular pattern so as to create alternating first and second angles, a method comprising the step of: polarizing adjacent ones of said poles to form pairs of adjacent salient magnetic poles where the poles of each pair are of opposite polarity.	1. In EDM the first (stator) and second (flexispline) members do not experience relative rotation as both the first and second members arerotatively fixed . 2. In EDM there are no defined poles on the second member (flexispline) and all stator poles are equally spaced/the same (see EDM figures 13 & 17) .
31. A method as set forth in claim 30 including the step of: polarizing said pairs of adjacent salient poles such that neighboring poles of different pairs are of the same polarity, thereby preventing magnetic circuits forming between pairs.	1. Claim (31) depends on claim (30) and claim (30) is not representative of EDM. 2. In EDM neighboring adjacent poles never have the same polarity since alternate poles are wound in opposite directions (see EDM figures 14,19 & 23) and are excited by similar uni-polar DC pulses

32. A method of energizing a motor having unevenly spaced stator poles and evenly spaced rotor poles by a polyphase source, said method comprising the steps of: energizing at least two pairs of adjacent poles of said stator by a phase of said polyphase source to form adjacent poles of opposite polarities; and arranging the relative polarities of said stator poles such that the flux switching frequency in at least a portion of the back iron area of said stator is less than the phase frequency multiplied by the number of phases.	1. In EDM stator poles are evenly spaced and there are no defined poles on the secondary member (flexispline), see EDM figures 13 & 17. 2. In EDM all portions of the stator-back-iron experience the same flux switching frequency pattern. 3. In EDM the relative polarities of stator poles are arranged not to control flux switching frequency but rather to avoid flux reversal.
33. A method as set forth in claim 32 wherein the relative polarities of the pairs of adjacent poles polarized by each phase provide a flux switching frequency in at least a portion of said back iron area of stator poles which is equal to the phase frequency.	1. Claim (33) depends on claim (32) and claim (32) is not representative of EDM. 2. In EDM relative polarities of pairs of adjacent poles are not determined on the basis of flux switching frequency but rather to avoid flux reversal. 3. In EDM all portions of the stator-back-iron experience the same flux switching frequency pattern.
34. A method as set forth in claim 32 including the step of: arranging the relative polarities of said stator poles such that the flux reversal frequency in at least a portion of the back iron area of said stator is zero.	1. Claim (34) depends on claim (32) and claim (32) is not representative of EDM. 2. In EDM relative polarities 3. In EDM all portions of the stator-back-iron experience the same flux switching frequency pattern.

CLAIM 11	**STEPHENSON TEACHING**	**Secondary References**
An electromagnetic core in a structure of a continuous wave deflection in a magnetically		

permeable flexispline member in a flexispline motor comprising		
a series of stacked laminations stacked to form a unitary core having a hub and spoke configuration,		
such that a number of rectangular profile core legs extend radially from said core hub at evenly spaced intervals,		
each leg containing electromagnetic coils,		
each electromagnetic coil being sequentially energized from a source of electrical energy to produce a rotating electrical field in said electromagnetic core,		
and wherein magnetic forces produced in each complementary group of core legs is in a bucking relationship.		

CLAIM 11	**HENDERSHOT TEACHING**	**Secondary References**
An electromagnetic core in a structure of a continuous wave deflection in a magnetically permeable flexispline member in a flexispline motor comprising		
a series of stacked laminations stacked to form a unitary core having a hub and spoke configuration,		
such that a number of rectangular profile core legs extend radially from said core hub at evenly spaced intervals,		
each leg containing electromagnetic coils,		
each electromagnetic coil		

being sequentially energized from a source of electrical energy to produce a rotating electrical field in said electromagnetic core,		
and wherein magnetic forces produced in each complementary group of core legs is in a bucking relationship.		

US 4,227,092 Campagnuolo

Prior Art Claims	Comments
1. (a) Apparatus for generating electrical power, which comprises: (b) a relatively low-speed input shaft and a relatively high-speed output shaft, (c) means for manually rotating said input shaft, (d) harmonic drive means including a circular spline, a flexspline and a wave generator, said output shaft being rigidly connected to said wave generator, (e) magnetic rotor means connected to rotate with said high-speed output shaft, and (f) stator means positioned about said rotor means for generating electrical energy in response to rotation of said rotor means, (g) wherein said rotor means and said stator means are arranged concentrically within said flexspline of said harmonic drive means.	Note EDM = US Patent Application 10/526,776 (a) EDM also generates electrical power based upon an entirely different principle from that employed by Campagnuolo. (b) EDM does not embody or claim a high speed output shaft nor claim a relatively low speed input shaft (c) EDM does not embody or claim manual means for rotating an input shaft. (d) EDM does not embody or claim a wave generator rigidly connected to an output shaft, nor a mechanical wave generator. (e) EDM does not embody or claim a magnetic rotor means which rotates nor a high speed output shaft, nor a rotating rotor connected to a high speed output shaft. (f) EDM does not embody or claim a stator positioned about a rotor-means which rotates and does not claim to generate electrical energy in response to a rotating rotor means.

	(g) EDM does not embody or claim said rotor means arranged concentrically within said flexspline
2. The apparatus as set forth in claim 1, wherein said means for manually rotating said input shaft comprises a pair of handles, one connected to each end of said input shaft.	(a) Claim (2) depends on claim (1) of Campagnuolo which is not a valid comparison with EDM. (b) EDM does not embody or claim handles for either input or output of energy or torque. (c) EDM does not claim an input shaft
3. (a) The apparatus as set forth in claim 1, wherein said harmonic drive means comprises: (b) a ring-shaped circular spline directly coupled to said input shaft so as to rotate therewith and having a plurality of fine teeth formed on its inner surface; (c) a substantially cylindrical flexspline having an end with a plurality of fine teeth formed thereon and positioned within said circular spline, the number of teeth on said flexspline different from that on said circular spline; and (d) a wave generator positioned within said flexspline and comprising an elliptical ball-bearing assembly to which said high speed output shaft is rigidly connected.	(a) Claim (3) depends on claim (1) of Campagnuolo which is not a valid comparison with EDM. (b,c,d) These elements are representative of all standard harmonic gear systems dating back to Musser's original US patent 2906143 Sept 1959 (d) EDM does not claim or embody a wave generator comprising an elliptical ball bearing assembly nor a high speed output shaft rigidly connected to same.
4. The apparatus as set forth in claim 3, further comprising a casing through which said input shaft extends and for containing said harmonic drive means, said magnetic rotor means and said stator means.	(a) Claim (4) depends on claim (3) which depends on claim (1) of Campagnuolo which is not a valid comparison with EDM. (b) EDM does not claim or embody a magnetic rotor means. (c) EDM does not embody or claim a casing, nor an input shaft extending through such a casing (d) EDM does not embody or claim a casing for containing a harmonic drive means, magnetic rotor means, or stator means.

5. The apparatus as set forth in claim 4, wherein said flexspline and said stator means are rigidly connected to said casing so as to be stationary therewith.	(a) Claim (5) depends on claim (4) which depends on claim (3) which depends on claim (1) of Campagnuolo which is not a valid comparison with EDM. (b) EDM does not embody or claim said casing nor a flexspline or stator means rigidly connected to said casing.
6. The apparatus as set forth in claim 4, wherein said casing includes first bearing means for supporting said input shaft, and second bearing means for supporting said high speed output shaft.	(a) Claim (6) depends on claim (4) which depends on claim (3) which depends on claim (1) of Campagnuolo which is not a valid comparison with EDM. (b) EDM does not embody or claim a high speed output shaft. (c) EDM does not embody or claim said casing, or a casing which includes a first and second bearing means, or support for high speed output shaft
7. The apparatus as set forth in claim 6, wherein said casing includes a substantially cylindrical side wall and a pair of end plates, each of said end plates having a bearing sleeve through which said input shaft extends and in which said first bearing means are mounted.	(a) Claim (7) depends on claim (6) which depends on claim (4) which depends on claim (3) which depends on claim (1) of Campagnuolo which is not a valid comparison with EDM. (b) EDM does not embody or claim a casing which includes: a substantially cylindrical side wall, pair of end plates, bearing sleeve, first bearing means or its mounting.
8. The apparatus as set forth in claim 7, and further comprising a housing for said stator means rigidly mounted to one of said end plates and surrounding said rotor means and said output shaft, said second bearing means being positioned between said high speed output shaft and said housing.	(a) Claim (8) depends on claim (7) which depends on claim (6) which depends on claim (4) which depends on claim (3) which depends on claim (1) of Campagnuolo which is not a valid comparison with EDM. (b) EDM does not embody or claim a housing for: stator means, said end plates, rotor means, or high speed output shaft, nor a housing surrounding said rotor means and said output shaft.
9. The apparatus as set forth in claim 8, wherein said flexspline includes an end wall mounted between said one of said end plates of said casing and said housing.	(a) Claim (9) depends on claim (8) which depends on claim (7) which depends on claim (6) which depends on claim (4) which depends on claim (3)

	which depends on claim (1) of Campagnuolo which is not a valid comparison with EDM. (b) EDM does not embody or claim: said end plates, said casing, said housing
10. The apparatus as set forth in claim 1, wherein said magnetic rotor means comprises a samarium cobalt magnet attached to the outer surface of said high speed output shaft so as to rotate therewith.	(a Claim (10) depends on claim (1) of Campagnuolo which is not a valid comparison with EDM. (b) EDM does not embody or claim: magnets, a rotating magnetic rotor, nor a high speed output shaft .
11. Apparatus as in claim 1, wherein said input shaft is positioned concentrically within said output shaft.	(a) Claim (11) depends on claim (1) of Campagnuolo which is not a valid comparison with EDM. (b) EDM does not embody or claim: an input shaft which is positioned concentrically within said high speed output shaft.

Claim 13 has been rejected under 35 U.S.C. 103(a) as unpatentable over U.S. Patent No. 6,288,471 (Kometani et al.) in view of US Patent No. 4,227,092 (Campagnuolo et al.) or Japanese Patent No. JP-2-275146 (Kumagai).

Claim-13	Primary Teachings	Secondary Teachings
13. (CURRENTLY AMENDED) An electromagnetic core in a flexispline motor said core comprising a cylindrical configuration and having a series of radially extending rectangular [[~~profile~~] cross section teeth protruding	**Kometani (U.S. Patent No. 6,288,471) teaches:** 1) Kometani's patent deals with an AC alternator embodying a rotating secondary member (rotor), claw-shaped magnetic poles and non-uniformly pitched pole coil winding slots .	**Campagnuolo' Teaches: (US Patent No. 4,227,092)** 1) Campagnuolo's electric machine component is a 3 phase sinusoidal alternator, no commutator, has rotating rotor (Secondary) with fixed permanent magnets to provide rotating uncontrolled magnetic

from said core, said core having teeth of variable widths arranged in a regular sequence around the circumference of said core separated by slots of uniform width and wherein said widths optimize flux saturation levels in the magnetic iron circuit of said teeth.	2) Energy conversion is achieved by magnetic induction, not by varying reluctance as in Davison. 3) Express purpose of non-uniform slots is to reduce and or eliminate harmonic content of the generated sinusoidal electrical waveform output. In Davison the electrical activation waveform is unipolar DC pulses (which is desirably rich in harmonic content) and sinusoidal current is undesireable because it results in magnetic flux reversal and thus iron core hysterisis energy losses. In Davison the claims#13, 14, 15 are specifically directed to focus and increase the radially directed magnetic force and thus increase torque output. 4) The claw-shaped magnetic poles are apparently intended to reduce vibration/resonance and retain coil windings. Davison specifically stipulates that the core teeth tips "are of rectangular plan form" , nut dumbbell or claw-shaped, since these shapes result in reduced radial magnetic force and stray / fringing magnetic flux. 5) Kometani, Campagnuolo and Kumagai do not discuss or claim varying teeth/ slot width for the purpose of focusing and increasing the radially directed magnetic force to deflect a flexispline. In any case this issue is not relevant or possible in Campagnuolo and Kometani. Kumagai is silent on this issue. Thus the rejection of claim#13 on the basis of Kometani, Campagnuolo and Kumagai is invalid.	field which operates on a different physical principle (Faraday's second law of magnetic induction as opposed to variable reluctance embodied in Davison). 2) Campagnuolo does not refer to or claim variable width teeth and slot width. *** **Kumagai's Teaches: (JP 02-275146)** 1) Kumagai's patent indicates claims to a harmonic gear motor in which the conventional rotating elliptical cam is replaced with a sealed-in magnetic ferro-fluid which when subjected to a concentrated magnetic flux field coalesces into a semi-rigid body. When the electro magnetic field rotates, this semi-rigid fluid body rotates, replacing the action of the rotating mechanical cam. 2) The claimed purpose of this device is to minimize wear and friction losses associated with a conventional harmonic gear using an elliptical cam. 3) In this patent there is no teaching as to: a) how the device is controlled, commutated or powered b) the design of the magnetics, including the ferro fluids 4) It would appear from the brief schematic that the output

		power is limited to low values 5) There is only a very limited claim and no reference to core teeth/slots/poles etc. Therefore the rejection of claims#13 based upon Kumagai are invalid

Summary for claim: 13

1. Rejection of claim-13 based upon Kometani in view of Campagnuolo or Kumagai is not tenable for the reasons shown in the above chart and as argued above..

Claim 13	**Kometani**	**Campagnuolo or Kumagai**
13. An electromagnetic core in a flexispline motor said core comprising		
a cylindrical configuration and having a series of radially extending rectangular profile teeth protruding from said core,		
said teeth having teeth of variable widths arranged in a regular sequence around the circumference of said core		
separated by slots of uniform width.		

4) Claim 12 has been objected to because of disordered claim dependency.

That claim has been amended to correct the formal error.

5) Claim 18 has been objected to as containing abbreviations.

Although the "abbreviations" were merely alphanumeric identifiers, Applicant has replaced LRS with Z, SGT with Y and RGT with X to clarify the claim.

REMARKS CONCERNING THE AMENDMENTS

The above amendments have been made in response to issues of patentability. All Rejections have been traversed and all Claims are believed to be in condition for allowance.

FILED ON BEHALF OF THE INVENTOR

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